IDAHO DUNE TIGER BEETLE SURVEY 1995

Cicindela arenicola Rumpp

by
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INTRODUCTION

The Idaho dunes tiger beetle (*Cicindela arenicola* Rumpp) is under consideration to be listed by the U.S. Fish and Wildlife Service as a threatened or endangered species. The beetle became a species of concern when it was reported that the Bruneau Dunes' population had decreased and that beetles were no longer present in some other locations where they were previously collected (Anderson 1988). Although the Idaho dunes tiger beetle is one of sixteen tiger beetles known to occur in Idaho, it is believed to be the only species unique to Idaho (Shook 1984).

The Idaho dunes tiger beetle is a sand-dwelling species. Adult beetles are readily observed actively searching for prey on and around dunes. Larvae are found in vertical burrows waiting for passing prey in the more stable areas of the dunes. Both adults and larvae consume other invertebrates (Anderson 1988). The larvae will reside in the burrows between two to four years to complete their development. As the larvae grow, the burrows are periodically excavated to larger sizes and deeper depths (Bauer 1991). The beetle has three recognizable biotypes: a green/metallic green color variant to the West (Owyhee County), a coppery/brownish color variant to the East (Fremont County), and a coppery color variant mixed with a green color variant centrally located (Power, Bannock and Bonneville Counties) (Anderson 1989).

Historically, the known distribution of the beetle was limited to the St. Anthony Sand Dunes, the Bruneau Sand Dunes, a series of sand dunes in Power County and a few other small dunes along the Snake River Plain (Bauer 1991). Recent surveys have documented that the species is more widely distributed than once believed (Baker et al. 1994; Makela 1994). The draft "Idaho Dunes Tiger Beetle Habitat Conservation Assessment and Strategy," identified the need to refine the known distribution of the species (U.S. Bureau of Land Management 1995). The objective of this study was to continue documenting the presence or absence of adult tiger beetles and larvae burrows especially in previously unsurveyed, outlying areas. Surveys were conducted from, 31 March 1995 to 5 June 1995, as the weather permitted.

STUDY AREA

Surveys were conducted north of the Snake River in the BLM's Boise, Burley, Idaho Falls and Shoshone Districts, USFWS's Minidoka National Wildlife Refuge and Idaho Department of Fish and Game's Sand Creek Wildlife Management Area. Counties represented included Blaine, Bonneville, Fremont, Gooding, Jerome, Lincoln, Owyhee, Power and Washington. Beetle populations were found on individual sand dunes that varied greatly in size from less than an acre to over 2,500 acres. Many of the individual dunes were part of a larger dune complex. A dune complex was defined as a series of small dunes within a larger sagebrush and grass matrix (Makela 1994). Some beetle populations occurred in what I called "blow-outs." Blow-outs were either open, sandy spots that occurred in stabilized dunes or just deposits of open sand. They were generally less than an acre in size.

METHODS

Potential tiger beetle habitats were selected from 1979, 1980 and 1987 color aerial photographs and from consultation with local contacts. The presence or absence of adult Idaho dunes tiger beetles was documented. Larvae burrows were also noted if encountered, but did not constitute presence of the species unless adults were also observed. The presence of burrows of tiger beetle species other than *C. arenicola* necessitated caution since burrows of different species can be very similar in appearance. Sites were generally visited once. However, in cases of marginal weather conditions, sites without beetles were resurveyed during optimal weather conditions. Surveys were performed by systematically walking the potential habitat area while visually scanning for both adult tiger beetles and larvae burrows. The time required to find the first adult beetles was recorded for each site. Habitat information included dominant plant species on and around dunes. Disturbance factors such as Off Road Vehicles (ORVs), noxious weeds and livestock were recorded. Ambient air and sand surface temperatures were measured using a mercury thermometer. Additional weather information (wind speed and cloud percent coverage) was also noted. Photographs were taken of each documented site. Beetle locations were plotted on 1:100,000 surface management maps and on 1:24,000 topographic maps. A Global Positioning System (GPS) unit was used to determine the exact location of most sites.

RESULTS

Thirty new Idaho dunes tiger beetle habitat sites were documented in five different counties (Table 1). The sites in the Shoshone BLM District (Lincoln County) and the

Sand Creek WMA (Fremont County) were the first recorded for those areas. The new sites in Fremont County, Lincoln County and Bonneville County expand the known distribution of the Idaho dune tiger beetle (Figure 1). The new sites in Blaine County and Power County refine distributions within those areas. Appendix A consists of 1:24,000 topographical maps that have the new *C. arenicola* sites plotted. Table 2 has the habitat descriptions for the new sites and the relative abundance of the beetle. Burley sites 92-04 and 94-02 (95-02) were resurveyed and the results are in Table 3.

At the Shoshone site 95-05 and the Idaho Falls site 95-13, different tiger beetle species were found co-located with the Idaho dunes tiger beetle. Because tiger beetle species have similar appearing larvae burrows, sites were determined to be valid only if an adult Idaho dunes tiger beetle was present. *Cicindela tranquebarica* Herbst was found at the Shoshone sites 95-03 and 95-05. *C. tranquebarica* was also observed copulating, 27 May 1995, south of Glenns Ferry in the Jarbidge Resource Area. *Cicindela repanda* Lej. was found on the dunes north of Weiser in Washington County, but *C. arenicola* was not observed. *Cicindela oregona* LeConte was found at the Idaho Falls site 95-13. Interestingly, I observed a *C. arenicola* attack and chase away a *C. oregona.* A total of nine *C. arenicolas* and three *C. tranquebaricas,* one *C. repanda* and one *C. oregona* were collected for preservation at the Burley District office, U.S. Bureau of Land Management. Table 4 has the legal descriptions for the locations of the non--*C. arenicola* species.

Idaho Dunes Tiger Beetle Locations (Appendix A - maps of new *C. arenicola* sites):

1. Burley District. (Appendix: A1-A3) Potential habitats were surveyed in the area southeast of Hawley and southwest of Quigley. The sites lay within a band of dune

complexes that roughly follow the railroad. Studying the aerial photographs, it appears historically the area had more and larger dunes. The dunes have since been modified and fragmented by crested wheatgrass seedings, cheatgrass invasions and farming. In Power county, time constraints prevented me from resurveying potential dune habitats that were searched during marginal weather and had tiger beetle larvae burrows (Table 3). Individual beetles of the green/metallic green color variant and the coppery, green color variant were seen. Beetles were observed copulating, 5 June 1995, at the Bonanza Lake site.

The Bonanza Lake dune (Burley 95-04) was surveyed twice: 2 June 95 and 5 June 95. During the first survey, only potential Idaho dunes tiger beetle larvae burrows were visible. During the second survey, a mating pair was observed after 4 minutes and 32 seconds of searching. No other adult beetles were seen. Both times, photographs and notes were taken of ORV and cattle use. On the 2nd, after a period of rain, the area appeared to have minimal disturbance. After the weekend, on the 5th, moderate ORV use was evident. The ORVs appeared to stay on the trails but cattle tracks were found throughout the dunes and in larvae beds. It is not known if the increased cattle disturbance was caused by the cows being pushed off the trails by the ORVs or if the number of cattle was increased.

2. Minidoka National Wildlife Refuge. (Appendix: A3, A4) The north shore of Lake Walcott was surveyed. This area is within the same band of sand dunes as those of the BLM's Burley District. Minidoka sites 95-01 and 95-02 were of very poor habitat quality, yet yielded adult Idaho dune tiger beetles and larvae burrows. These sites were

stabilized blow-outs covered with cheatgrass. The tiger beetles were the coppery and green color variants.

Two other suitable habitat sites were searched during unfavorable weather conditions. No adult beetles were observed but potential tiger beetle larvae burrows were seen. These sites had no physical disturbances and native vegetation predominated the dunes. These sites should be resurveyed for adult beetles (Table 3).

3. Idaho Falls District. (Appendix: A5-A9) The beetle locations documented in Fremont County, north of St. Anthony and east of Red Road, extended the known distribution of the beetle to the Northeast. This location had the largest dunes surveyed in this study and consisted of two dune complexes: Mikesell Reservoir Dunes and the northern portion of the St. Anthony Dunes. The smaller dune complex, the Mikesell Reservoir Dunes, was substantially stabilized with native vegetation. Yet, it appeared to support one of the larger beetle population densities documented for this study. Due to the size of two dunes within the St. Anthony Dunes complex, survey points were taken along the perimeter of the dunes. Although the weather varied greatly during the surveys, it seemed that the tiger beetles were not evenly dispersed throughout the large dunes. Minimal physical disturbance by ORVs, livestock and moose was noted. Native vegetation dominated the dunes. Copulating was noted on, 17 May 1995, and the beetles were of the coppery/brownish color variant.

Two new beetle sites were found in Bonneville County. These sites are associated with the Idaho Falls City golf course and are open to public sand removal. It appeared

that over half of each sand dune had been removed. Tiger beetles were of both the coppery color variant and the green color variant.

4. Sand Creek Wildlife Management Area. (Appendix: A9) These sites are located on the northernmost dune of the St. Anthony dune complex. This dune was moderately stabilized with native vegetation and had minimal disturbance caused by grazing moose. Coppery/brownish beetles were fairly evenly dispersed throughout the dune. Copulating was observed on, 9 May 1995.

5. Shoshone District. (Appendix: A10-A12) Idaho dunes tiger beetles were found on the Dietrich dune complex. The sites are the only known sites for the Shoshone District and significantly expand the known range of the beetle northwesterly from the Burley sites. The Dietrich dune complex was historically a large complex that was once heavily grazed. It was planted with crested wheatgrass as a part of a stabilization project and rested from grazing for about fifteen years (S. Popovich personal communication 1995). Comparing the aerial photographs from 1979 and 1988 of the Dietrich dune complex, it is possible to see the stabilization that has occurred within only nine years (maps: Appendix A-11 and A-12). The sites surveyed were blow-outs and small dunes where the crested wheatgrass did not establish. Beetles were of the green/metallic green color variant.

In November of 1994, I identified and mapped potential *C. arenicola* habitats using 1979 and 1980 aerial photographs. I used these maps for the survey to find potential tiger beetle habitats. Of the sites identified, only the Dietrich dune complex had *C. arenicola.* Many of the sites have been stabilized by crested wheatgrass, cheatgrass

and native vegetation. Table 5 has the legal descriptions of the five most suitable habitats in the Shoshone District where *C. arenicola* was not found. These sites were visited at least twice. Due to time constraints, I did not field-proof all of the potential habitat sites that I had identified for the Shoshone District. Appendix B consists of the maps of the sites that I did not visit and that could be potential tiger beetle sites. Probably less than one quarter of the sites will be suitable habitat because the aerial photographs I used were fairly old and the land or vegetation may have been subsequently modified.

6. **Boise District.** No new *C. arenicola* sites were found in this district. However, surveys of the Weiser dune and areas identified by Jim Klott in the Jarbidge Resource Area, did produce different tiger beetle species (Table 4). The Weiser dune has suitable *C. arenicola* habitat and is listed in Table 5 for further monitoring. It was visited only once. Transplanting *C. arenicola* from other sites should be considered.

Other observations:

The patterns on the backs of the beetles varied within the populations. The patterns differed in the barring created by the ivory markings. Due to the variations, barring patterns can not be used for identifying *C. arenicola.* Pattern variations were not determined between populations.

Tiger beetles were found on predominantly clear days with the ambient air temperature at least 60°F and on surface dried sand with a minimal surface temperature of 73°F. The average surface sand temperature for finding active adult beetles was 85°F. A maximum temperature for finding active adult beetles was not determined.

DISCUSSION

In 1995, adult Idaho dunes tiger beetles were documented on thirty locations across Blaine, Power, Fremont, Bonneville and Lincoln Counties, Idaho. Occurrence of the species in Lincoln County (Shoshone BLM District) has not been previously documented. The largest number of beetles seemed to exist on the Mikesell Reservoir dunes, the Sand Creek WMA dunes and the Dietrich dunes. Few beetles were observed at any one time at the other documented sites. Possible factors for the lower numbers include the unusually wet spring, poor larvae habitat quality or naturally low population densities. It is not known if these smaller sites have naturally occurring low beetle densities or if they are becoming constrained as the result of the population's responses to deterioration of conditions either by vegetative encroachment or physical disturbance. Much of the limited, available habitat has undergone reduction and fragmentation via dune stabilization projects on public lands and farming of private lands. For example, many of the potential dune habitats identified in the Shoshone District from 1979 and 1980 aerial photographs have been stabilized via crested wheatgrass seedings. Habitats have also undergone modification by livestock, ORVs, and non-native plants such as cheatgrass and Russian thistle. Surprisingly, I found adult beetles and larvae burrows at sites that did not meet the classic habitat criteria. For example, I found beetles in areas with heavy livestock use (Burley site 95-5) and in areas semi-covered with cheatgrass (Minidoka NWR sites 95-1 and 95-2). Just how tolerant the beetles are to long term habitat deterioration or disturbance of this nature is not known. Therefore, areas like the

Bonanza Lake dune which is being impacted by both cattle and ORVs, may warrant more intensive monitoring.

The colonization capabilities of the beetle might play an important role in its long term survival as a species. As population numbers become constrained at unsuitable sites, individuals must be able to disperse and find new sites to colonize. It is reported that the likely dispersal rate of the beetle occurs at the rate of one-half mile per two months in a step-wise manner between dunes, and that it is unlikely that adults disperse more than 0.75 miles from their natal dune (Anderson 1989). The limited mobility of the beetle combined with limited, suitable sites, hinders the beetle's colonization capabilities. The Shoshone District had several apparently suitable habitat sites where no *C. arenicolas* were found. Considering the distance of these potential habitats from the one known site in the Shoshone District, it is unlikely that these sites will be colonized. Consideration should be given to the possibility of transplanting *C. arenicola.*

The weather sensitivity of the Idaho dunes tiger beetle made it difficult to survey during 1995's unusually cool, wet spring. For example, I was at a site with no apparent beetle activity, yet when the sun came out, beetles seemed to virtually "pop" from the sand. They disappeared again when the clouds covered the sun. I found beetles active at the minimal surface temperature of 73°F on clear, sunny days or on partially cloudy days when the sun was able to sufficiently warm the sand. This differs from Bauer's study (1991). She observed adult beetle activity at a minimal surface temperature of 66°F on sunny days. She also noted that the frequency the larvae surfaced was connected to the ambient air temperature and the soil's moisture content. It is possible that the species is

not only sensitive to day to day weather changes but also, to long term weather conditions. Perhaps, the past drought Idaho has experienced has directly or indirectly affected the survival of the beetle. The larvae and egg development might be more sensitive to soil moisture content and solar radiation than previously believed. Also, a negative effect of the drought on other insect species might have lowered the prey availability for the tiger beetle.

Recent surveys have primarily been conducted north of the Snake River. The only known viable Idaho dunes tiger beetle locations found south of the river, are in the Bruneau Dunes area. Subsequent surveys should try to expand the known distribution of the beetle on the southern side of the Snake River especially within the Fort Hall Reservation, east of American Falls Reservoir.

A key for identifying the tiger beetle species of Idaho would be valuable. Some *Cicindela* species are only slightly different morphologically. For example, Dr. Charles Baker (Boise State University), showed me a *Cicindela* species that very closely resembled *C. arenicola.* However, the two species exist in different habitats.

SUMMARY

1. Thirty new Idaho dunes tiger beetle sites were identified.

2. For the first time, Idaho dunes tiger beetle occurrences were documented for the Shoshone BLM District (Lincoln County) and the Idaho Department of Fish and Game's Sand Creek WMA (Fremont County).

3. Habitat quality varied by differing degrees of vegetative stabilization and physical disturbances. Crested wheatgrass seedings and the encroachment of non-native weedy species have reduced and degraded some available habitat sites. The effects of physical disturbances caused by livestock and ORVs need further study.

4. Adult Beetles were not found when the sand surface temperature was lower than 73°F.

5. Further surveys south of the Snake River and the Fort Hall Reservation would further expand the known distribution of the Idaho dune tiger beetle.

6. A reliable key for identifying the tiger beetles of Idaho is needed.

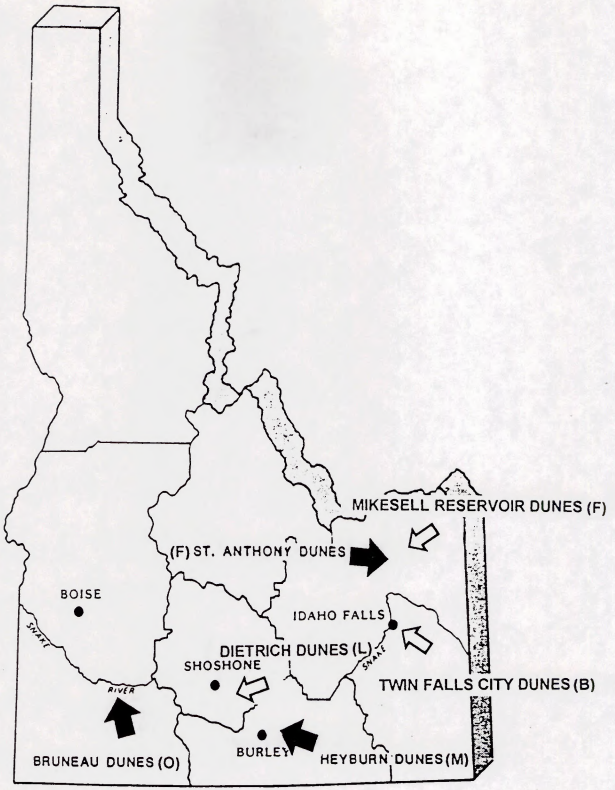

FIGURE 1. Idaho dunes tiger beetle historic locations and significant 1995 survey sites. Bureau of Land Management districts are outlined on the map.
LEGEND: Historic Sites (➡), New Significant Sites (⇨), Bonneville County (B), Fremont County (F), Lincoln County (L), Minidoka County (M) and Owyhee County (O).

LAND STEWARDSHIP	SITE NUMBER	COUNTY	TOPOGRAPHIC MAPS	OBSERVER	LEGAL DESCRIPTIONS
Burley BLM District	95-01	Blaine	Lake Walcott West	D.L., P.M.	T.8S., R.26E. Sec 23: NE1/4 of SW1/4
	95-03	Power	Gifford Spring	D.L.	T.8S., R.28E. Sec 23: SE1/4 of NE1/4
	95-04	Power	Register Rock	D.L.	T.8S., R.29E. Sec 16: SW1/4 of SE1/4
	95-05	Power	Register Rock	D.L.	T.8S., R.29E. Sec 17: SW1/4 of NE1/4
Sand Creek Wildlife	95-01	Fremont	Black Knoll	D.L.	T.9N., R.41E. Sec 8: SE1/4 of SW1/4
Management Area	95-02	Fremont	Black Knoll	D.L.	T.9N., R.41E. Sec 8: SE1/4 of SW1/4
Idaho Falls BLM	95-03	Fremont	Black Knoll	D.L.	T.9N., R.41E. Sec 8: SW1/4 of SE1/4
District	95-04	Fremont	Black Knoll	D.L.	T.9N., R.41E. Sec 8: NE1/4 of SE1/4
	95-05	Fremont	Black Knoll	D.L.	T.9N., R.41E. Sec 19: SE1/4 of NW1/4
	95-06	Fremont	Black Knoll	D.L.	T.9N., R.40E. Sec 23: NW1/4 of SE1/4
	95-07	Fremont	Black Knoll	D.L.	T.9N., R.40E. Sec 26: SW1/4 of SE1/4
	95-08	Fremont	Lemon Lake	D.L.	T.9N., R.41E. Sec 14: NE1/4 of NW1/4
	95-09	Fremont	Lemon Lake	D.L.	T.9N., R.41E. Sec 11: SW1/4 of NE1/4
	95-10	Fremont	Lemon Lake & Blue Crk Reservoir	D.L.	T.9N., R.41E. Sec 11: SW1/4 of NE1/4
	95-11	Fremont	Black Knoll	D.L.	T.9N., R.41E. Sec 17: SE1/4 of NW1/4
	95-12	Fremont	Black Knoll	D.L.	T.9N., R.40E. Sec 34: NW1/4 of NE1/4
	95-13	Fremont	Black Knoll	D.L.	T.9N., R.40E. Sec 35: SE1/4 of SE1/4
	95-14	Fremont	Big Grassy Ridge SE	D.L.	T.8N., R.40E. Sec 9: NW1/4 of NW1/4
	95-15	Fremont	Big Grassy Ridge SE	D.L.	T.8N., R.40E. Sec 8: NW1/4 of NE1/4
	95-16	Fremont	Big Grassy Ridge SE	D.L.	T.8N., R.40E. Sec 8: SE1/4 of NW1/4
	95-17	Fremont	Big Grassy Ridge SE	D.L.	T.8N., R.40E. Sec 17: NW1/4 of SE1/4
	95-18	Fremont	Ammon	D.L.	T.1N., R.38E. Sec 4: SE1/4 of SW1/4
	95-19	Fremont	Ammon	D.L.	T.1N., R.38E. Sec 9: NW1/4 of NE1/4
Minidoka National	95-01	Blaine	Lake Walcott West	D.L., M.J., S.B.	T.8S., R.26E. Sec 26: SW1/4 of SE1/4
Wildlife Refuge	95-02	Blaine	Lake Walcott West	D.L., M.J., S.B.	T.8S., R.26E. Sec 26: NW1/4 of SE1/4
	95-03	Blaine	Gifford Spring	D.L., M.J.	T.9S., R.28E. Sec 17: SW1/4 of SW1/4
Shoshone BLM	95-01	Lincoln	Dietrich Butte	P.M., J.T.	T.6S., R.19E. Sec 24: SW1/4 of NE1/4
District	95-02	Lincoln	Dietrich Butte	P.M., J.T.	T.6S., R.19E. Sec 24: NE1/4 of NE1/4
	95-05	Lincoln	Dietrich Butte	D.L., P.M.	T.6S., R.19E. Sec 23: SE1/4 of NW1/4
	95-06	Lincoln	Dietrich Butte	D.L., P.M.	T.6S., R.19E. Sec 23: NW1/4 of SE1/4

LEGEND ABBREVIATIONS: D.L. = Dia Logan, P.M. = Paul Makela, J.T. = Jim Tharp, M.J. = Mike Johnson, S.B. = Steve Buffard

TABLE 1. Verified Adult Idaho Dunes Tiger Beetle Locations. 1995 Survey.

LAND STEWARDSHIP	SITE NUMBER	* BEETLES : TIME	SITE FORMATION	** DOMINANT VEGETATION & PHYSICAL DISTURBANCES
Burley BLM District	95-01	1 :3 min	DUNE	AGCR, ELFL, CHSP, BRTE
	95-03	2 : 1 min	BLOW-OUT	AGCR, ELFL, PSLA, CHSP, LS
	95-04	2 : 4 min, 32 sec	BLOW-OUT	ORHY, ELFL, PSLA, CHSP, ORV, LS
	95-05	1 : 5 min	BLOW-OUT	PSLA, BRTE, ELFL, CHSP, LS
Sand Creek Wildlife	95-01	3 : 30 sec	DUNE	ELFL, ORV
Management Area	95-02	1 : 2 min	BLOW-OUT	ELFL, burnt ARTR, BESP
Idaho Falls BLM District	95-03	1 : 5 min	BLOW-OUT	ELFL, Rumex, BESP
	95-04	1 : 4 min	BLOW-OUT	ELFL, CHSP, BESP
	95-05	3 : 1 min	DUNE	ELFL
	95-06	3 : 5 min	DUNE	ELFL, Rumex, ARTR, PUTR
	95-07	1 (dead) : 10 min	DUNE	ELFL, CHSP, PUTR
	95-08	3 : 2 min	DUNE	ELFL, PUTR, ARTR, BESP
	95-09	5 : 30 sec	DUNE	ELFL, PUTR, ARTR, Rumex
	95-10	7 : 5 min	DUNE	ELFL, PUTR, EQSP, Cottonwood
	95-11	3 : 1 min, 30 sec	DUNE	ELFL, BESP, PUTR, CHSP
	95-12	3 : 2 min	DUNE	ELFL, CHSP, BESP, ARTR
	95-13	5 : 5 min	DUNE	ELFL
	95-14	2 : 5 min	DUNE	ELFL, PUTR, CHSP, LS
	95 15	2 : 5 min	BLOW-OUT	ELFL, PUTR, CHSP, ARTR, ORV, LS
	95-16	2 : 4 min	DUNE	ELFL, ARTR, PUTR, ORV, LS
	95-17	1 : 18 min	DUNE	ELFL, CHSP, PUTR
	95-18	1 : 7 min	DUNE	ELFL, CHSP, Rumex, SASP -- sand removal
	95-19	1 : 1 min	DUNE	ELFL, CHSP, Rumex, SASP-- sand removal
Minidoka National	95-01	1 : 10 min	BLOW-OUT	BRTE, LS
Wildlife Refuge	95-02	1 : 8 min	BLOW-OUT	ORHY, BRTE, CHSP, LS
	95-03	1 : 4 min	DUNE	AGCR, ELFL, PSLA, BRTE
Shoshone BLM District	95-01	5 : 3 min	BLOW-OUT	ELFL, SASP, LS
	95-02	many : 30 min	BLOW-OUT	ELFL, LS
	95-05	3 : 8 min	DUNE	ELFL, Rumex, LS
	95-06	1 : 3 min	BLOW-OUT	ELFL, LS

LEGEND ABBREVIATIONS: ORHY, *Oryzopsis hymenoides*, Indian ricegrass; PSLA, *Psoralea lanceolata*, Lemon scurf-pea; ELFL, *Elymus flavescens*, Yellow wild-rye; AGCR, *Agropyron cristatum*, Crested wheatgrass; ARTR, *Artemisia tridentata*, Big sagebrush; SASP, *Salsola* spp., Russian thistle; BESP, *Berberis* spp., unk Oregongrape; PUTR, *Purshia tridentata*, Bitter-brush; EQSP, *Equisetum* spp., Horsetail; CHSP, *Chrysothaninus* spp., Rabbit brush; BRTE, *Bromus tectorum*, Cheatgrass. ORV, Off Road Vehicles; LS, Livestock.

* The beetle to time ratio is the amount of time it took to see the first few adult *C. arenicolas.*

** The most abundant vegetation found on the dune is listed first.

TABLE 2. Idaho Dunes Tiger Beetles' Relative Abundance and Habitat Descriptions. 1995 Survey.

SITE NAME or LAND STEWARDSHIP	LEGAL DESCRIPTION	* BEETLES : TIME	SITE FORMATION	**DOMINANT VEGETATION & PHYSICAL DISTURBANCES
Burley 92-04	T.8S., R.26E. Sec. 23: NW1/4 of SW1/4	3 :5 min	DUNE	PSLA, ORHY, CHSP
Burley 94-01	T.8S., R.28E. Sec. 21: NE1/4 of NE1/4	1 : 20 min	BLOW-OUT	ORHY, PSLA, Cheatgrass, CHSP, LS
Minidoka National Wildlife Refuge	T.9S., R.29E. Sec. 8: SW1/4 of NW1/4	*** larvae burrows	DUNE	ORHY, ELFL, LS
	T.9S., R.27E. Sec. 24: NW1/4 of SE1/4	*** larvae burrows	DUNE	ORHY, PSLA, ELFL, LS
Burley BLM District	T.8S., R.29E. Sec. 18: NW1/4 of SW1/4	*** larvae burrows	BLOW-OUT	ELFL, AGCR, LS
	T.8S., R.28E. Sec. 13: SE1/4 of SW1/4	*** larvae burrows	BLOW-OUT	ELFL, AGCR, LS
	T.8S., R.29E. Sec. 16: NW1/4 of NE1/4	*** larvae burrows	BLOW-OUT	ELFL

LEGEND ABBREVIATIONS: ORHY, *Oryzopsis hymenoides*, Indian ricegrass; PSLA, *Psoralea lanceolata*, Lemon scurf-pea; ELFL, *Elymus flavescens*, Yellow wild-rye; AGCR, *Agropyron cristatum*, Crested wheatgrass; CHSP, *Chrysothamnus* spp., Rabbit brush. ORV, Off Road Vehicles; LS, Livestock.

* The beetle to time ratio is the amount of time it took to see the first few adult *C. arenicolas.*

** The most abundant vegetation found on the dune is listed first.

*** These sites should be resurveyed for adult *C. arenicola.*

TABLE 3. Results of resurveyed sites and sites where only potential Idaho dunes tiger beetle larvae burrows were found. 1995 Survey.

TIGER BEETLE SPECIES	LAND STEWARDSHIP	TOPOGRAPHIC MAPS	LEGAL DESCRIPTION
C. tranquebarica	Shoshone BLM District	Dietrich Butte	T.6S., R.19E. Sec. 23: SE1/4 of NW1/4
		Pagari	T.3S., R.20E. Sec. 35: SW1/4 of NE1/4
	Jarbidge Resource Area	Twentymile Butte	T.7S., R.10E. Sec. 13: NW1/4 of SE1/4
		Twentymile Butte	T.7S., R.10E. Sec. 12: NE1/4 of NE1/4
C. repanda	Boise BLM District	Olds Ferry	T.11N., R.7W. Sec. 17: NW1/4 of NW1/4
C. oregona	Idaho Falls District	Black Knoll	T.9N., R.40E. Sec. 35: SE1/4 of SE1/4

TABLE 4. Verified locations of *Cicindela tranquebarica* Herbst, *Cicindela repanda* Lej., and *Cicindela oregona* LeConte. 1995 Survey.

LAND STEWARDSHIP	TOPOGRAPHIC MAPS	LEGAL DESCRIPTION	CLOSEST TOWN	PHYSICAL DISTURBANCES
Boise BLM District	Olds Ferry	T.11N., R.7W. Sec. 17: NW1/4 of NW1/4	Weiser	ORV
Shoshone BLM District	Gooding SE	T.6S., R.16E. Sec. 35: SE1/4 of SW1/4	Jerome	ORV, Livestock
	Gooding SE	T.7S., R.16E. Sec. 2: SE1/4 of NE1/4	Jerome	none
	Gooding SE	T.7S., R.16E. Sec. 3: SE1/4 of SW1/4	Jerome	ORV
	Pagari	T.3S., R.20E. Sec. 35: SW1/4 of NE1/4	Richfield	Livestock
	Tunupa	T.5S., R.16E. Sec. 33: SE1/4 of SW1/4	Gooding	ORV, Dumping
LEGEND: ORV = Off Road Vehicles				

TABLE 5. The location of suitable Idaho dunes tiger beetle habitat sites where *C. arenicola* was not found. 1995 Survey.

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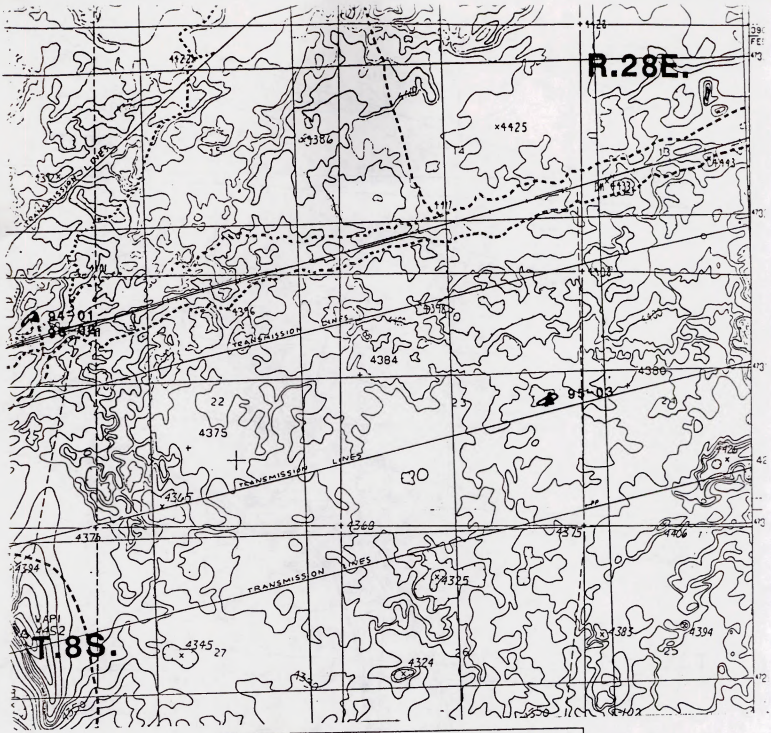
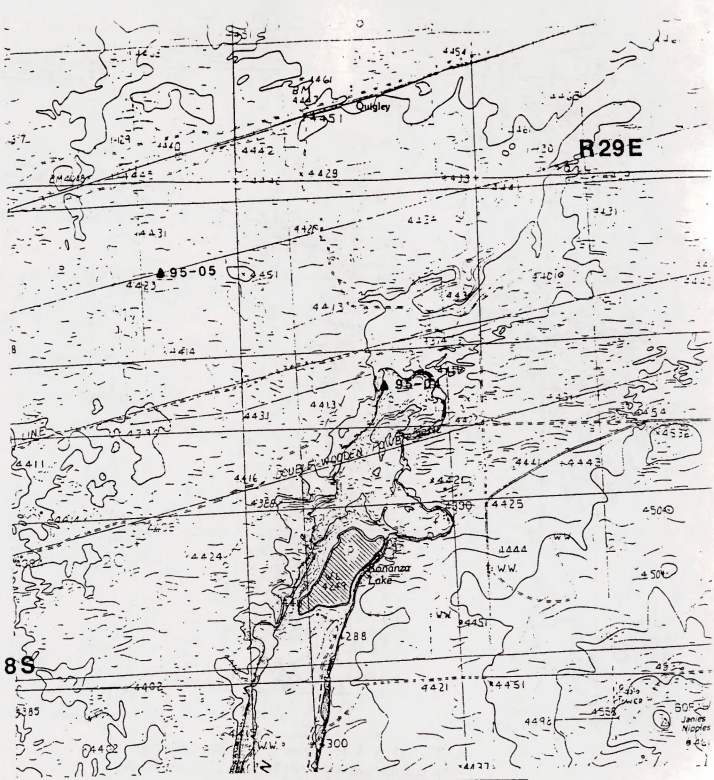
Makela, P.D. 1994. Burley District tiger beetle inventory. Bureau of Land Management Technical Bulletin 94-2. 20 pp.

Shook, G.A. 1984. Checklist of tiger beetles from Idaho (Coleoptera: Cicindelidae). Great basin Naturalist 44:159-160.

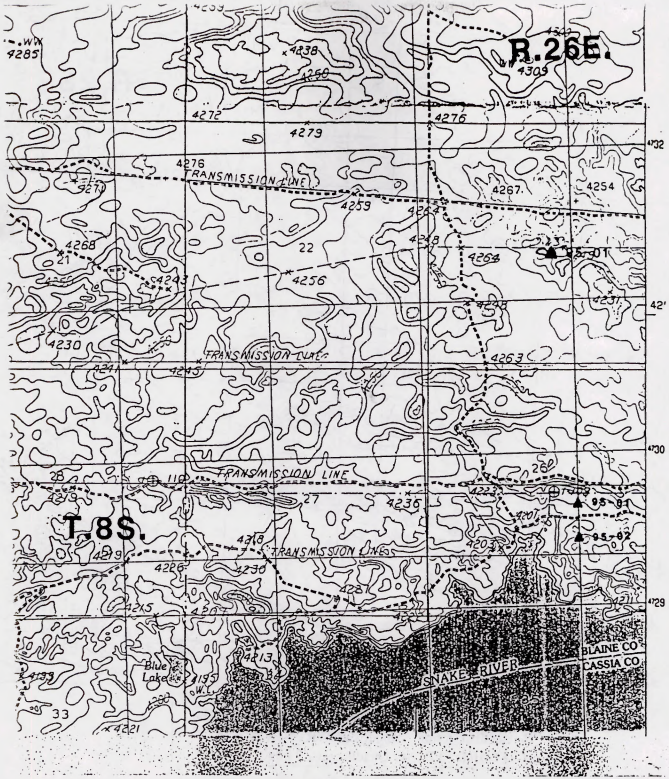
U.S. Bureau of Land Management 1995. Final Draft Habitat Conservation Assessment and Strategy, Idaho Dunes Tiger Beetle. 32 pp.



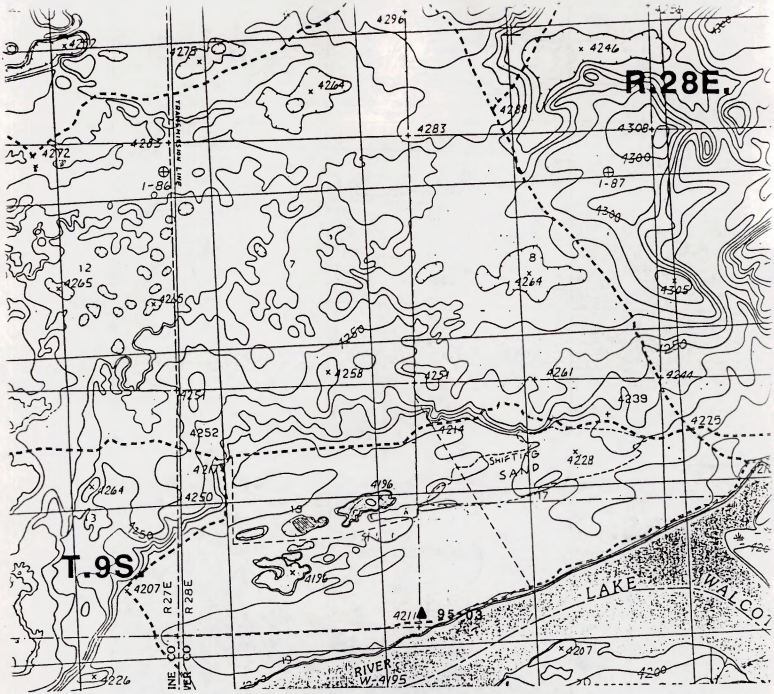
APPENDIX A-1: Survey 1995. Idaho dunes tiger beetle distribution. Burley BLM District. New Sites ▲. **GIFFORD SPRING** Quadrangle 1:24,000.



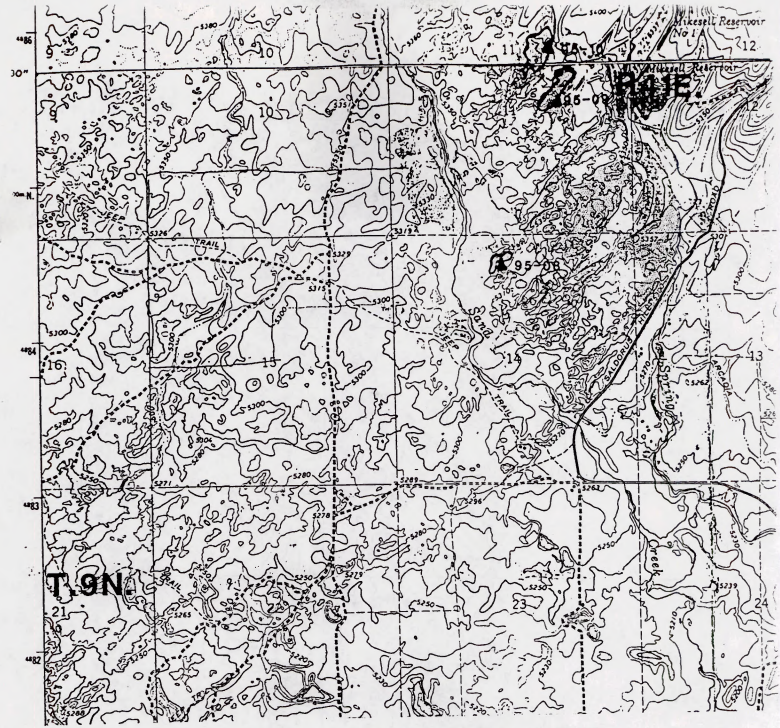
APPENDIX A-2: Survey 1995. Idaho dunes tiger beetle distribution. Burley BLM District. New Sites ▲. **REGISTER ROCK** Quadrangle 1:24,000.



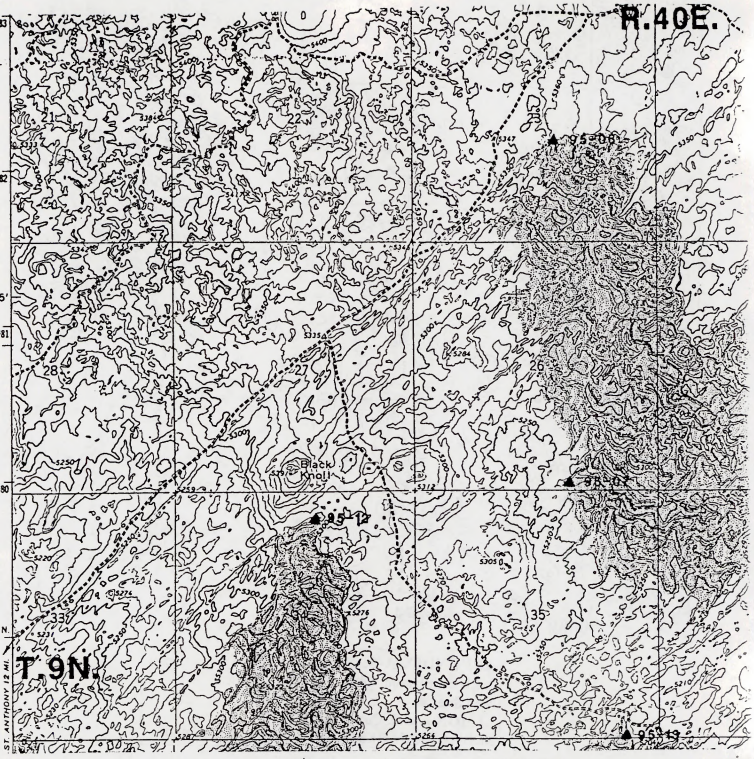
APPENDIX A-3: Survey 1995. Idaho dunes tiger beetle distribution. Minidoka NWR and Burley BLM District. New Sites ▲.
LAKE WALCOTT WEST Quadrangle 1:24,000.



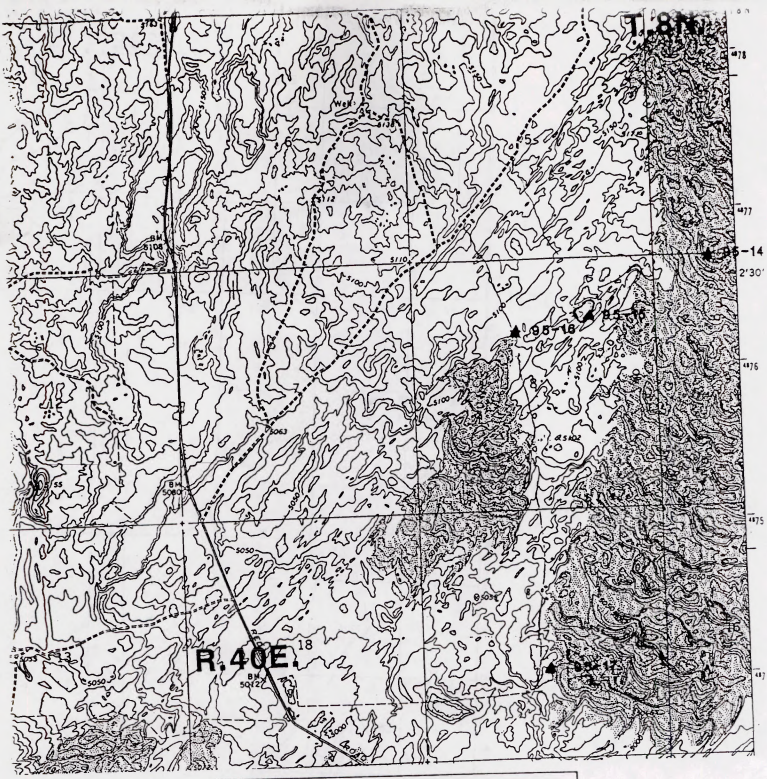
APPENDIX A-4: Survey 1995. Idaho dunes tiger beetle distribution. Minidoka NWR. New Sites ▲. **GIFFORD SPRING** Quadrangle 1:24,000.



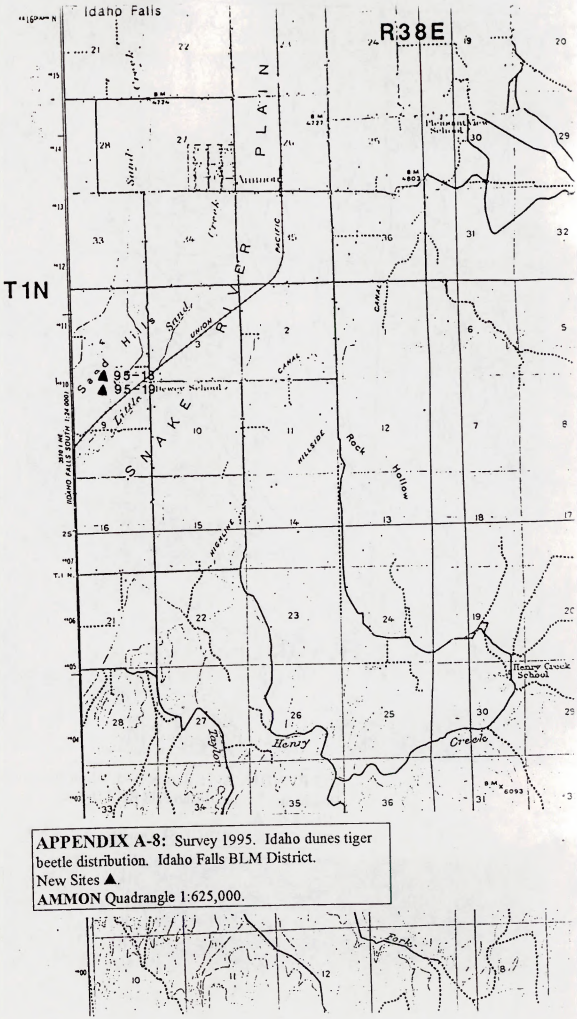
APPENDIX A-5: Survey 1995. Idaho dunes tiger beetle distribution. Idaho Falls BLM District.
New Sites ▲.
LEMON LAKE Quadrangle 1:24,000.
BLUE CREEK RESERVOIR Quadrangle 1:24,000.



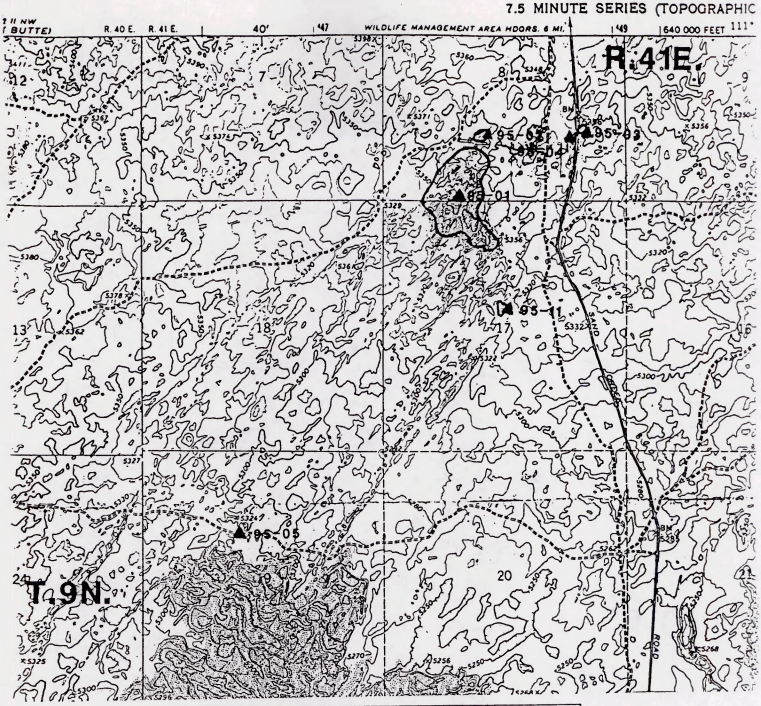
APPENDIX A-6: Survey 1995. Idaho dunes tiger beetle distribution. Idaho Falls BLM District.
New Sites ▲.
BLACK KNOLL Quadrangle 1:24,000.



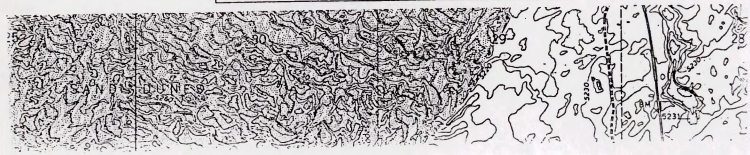
APPENDIX A-7: Survey 1995. Idaho dunes tiger beetle distribution. Idaho Falls BLM District. New Sites ▲.
BIG GRASSY RIDGE SE Quadrangle 1:24,000.

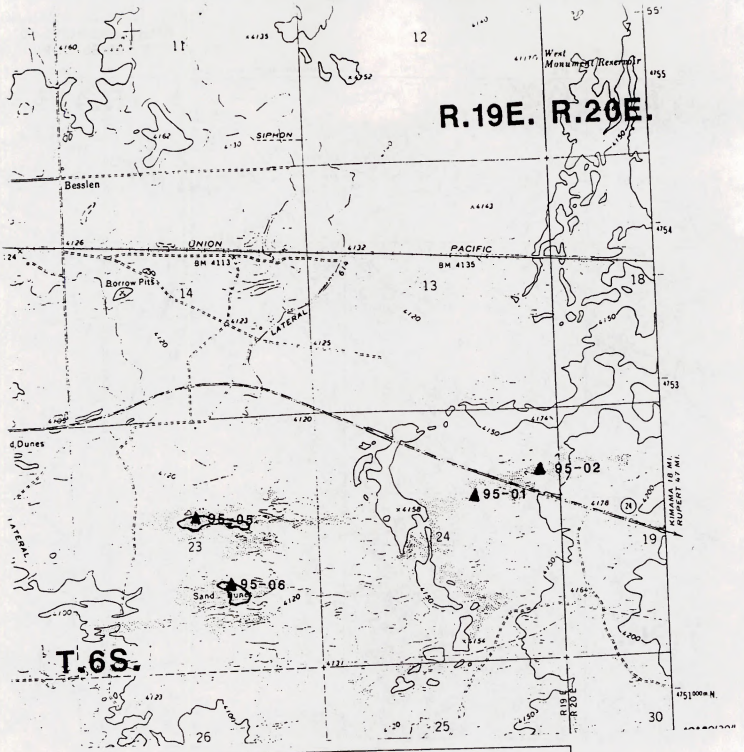


APPENDIX A-8: Survey 1995. Idaho dunes tiger beetle distribution. Idaho Falls BLM District.
New Sites ▲.
AMMON Quadrangle 1:625,000.

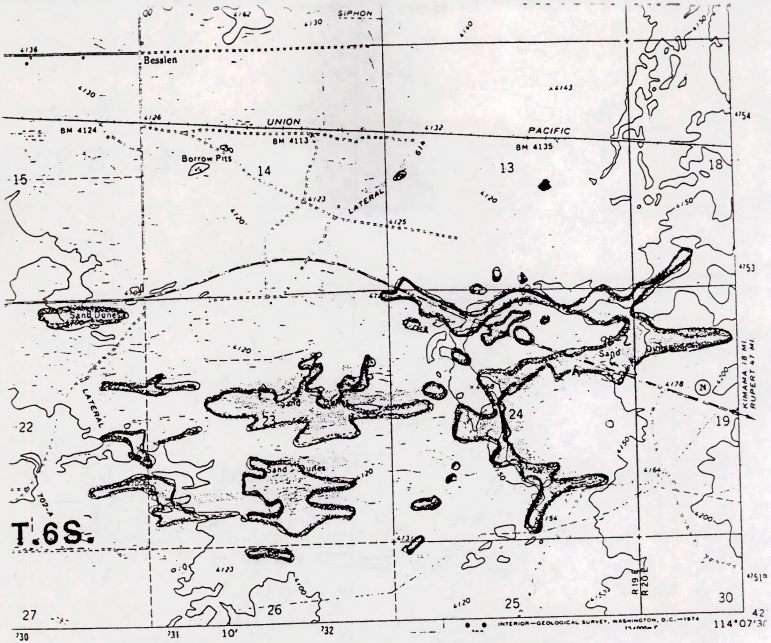


APPENDIX A-9: Survey 1995. Idaho dunes tiger beetle distribution. Sand Creek WMA and Idaho Falls BLM District. New Sites ▲.
BLACK KNOLL Quadrangle 1:24,000.

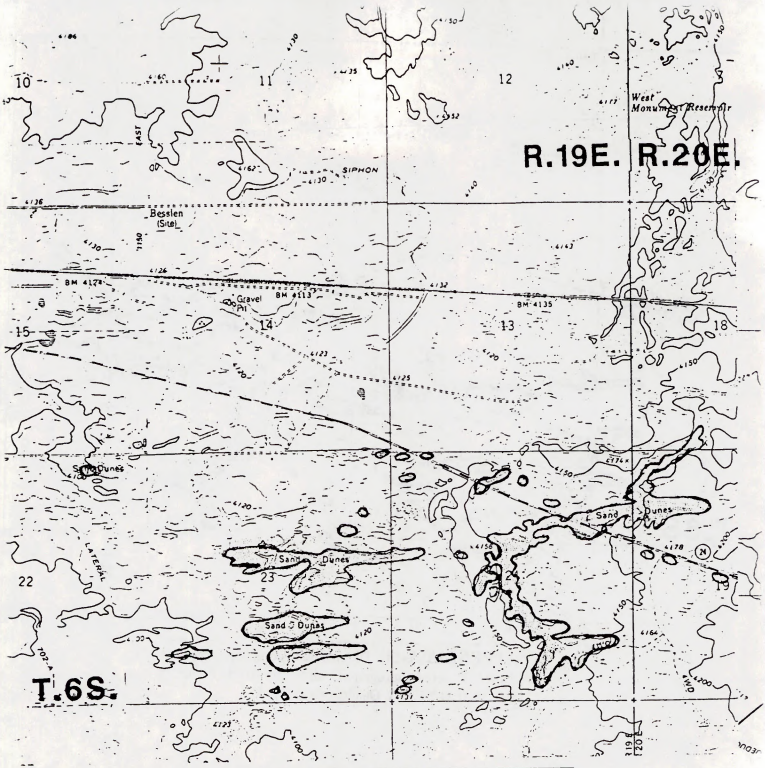




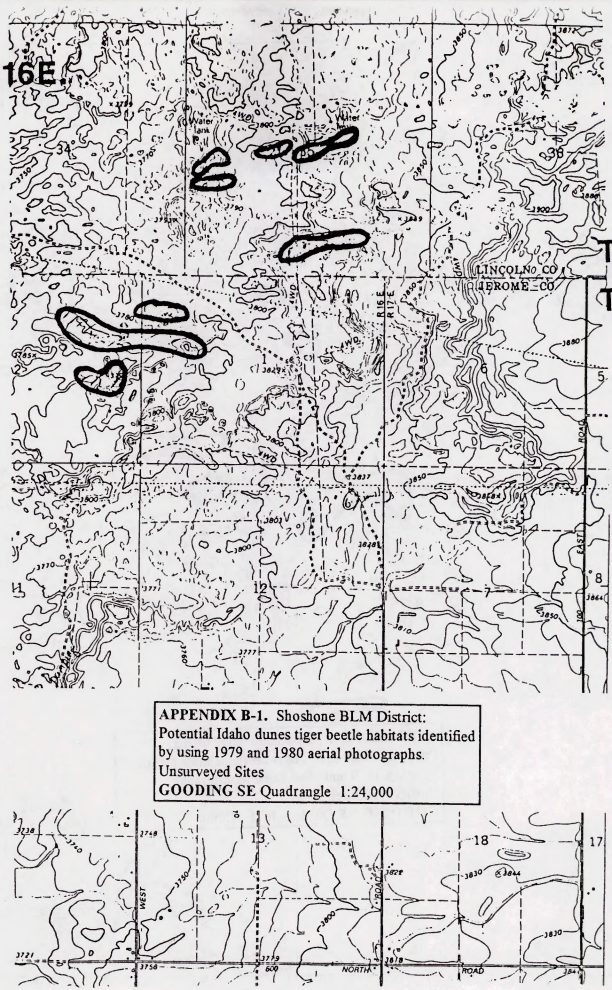
APPENDIX A-10: Survey 1995. Idaho dunes tiger beetle distribution. Shoshone BLM District. New Sites ▲.
DIETRICH BUTTE Quadrangle 1:24,000.



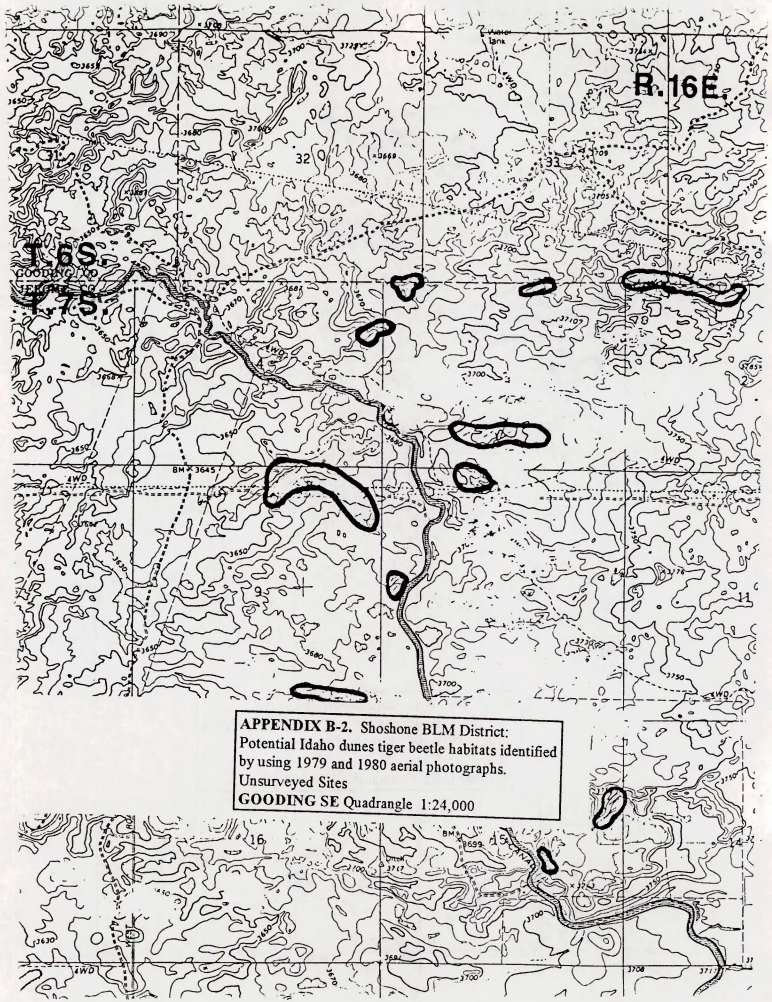
APPENDIX A-11: Dietrich dune complex as seen from 1979 aerial photographs. Shoshone BLM District. **DIETRICH BUTTE** Quadrangle 1:24,000.



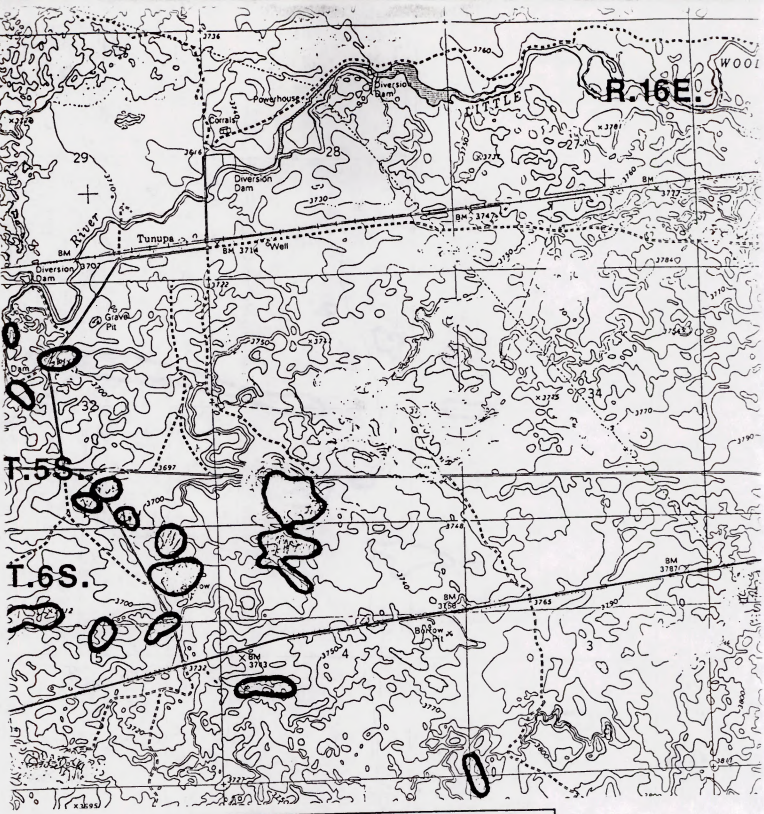
APPENDIX A-12: Dietrich dune complex as seen from 1988 aerial photographs. Shoshone BLM District. **DIETRICH BUTTE** Quadrangle 1:24,000.



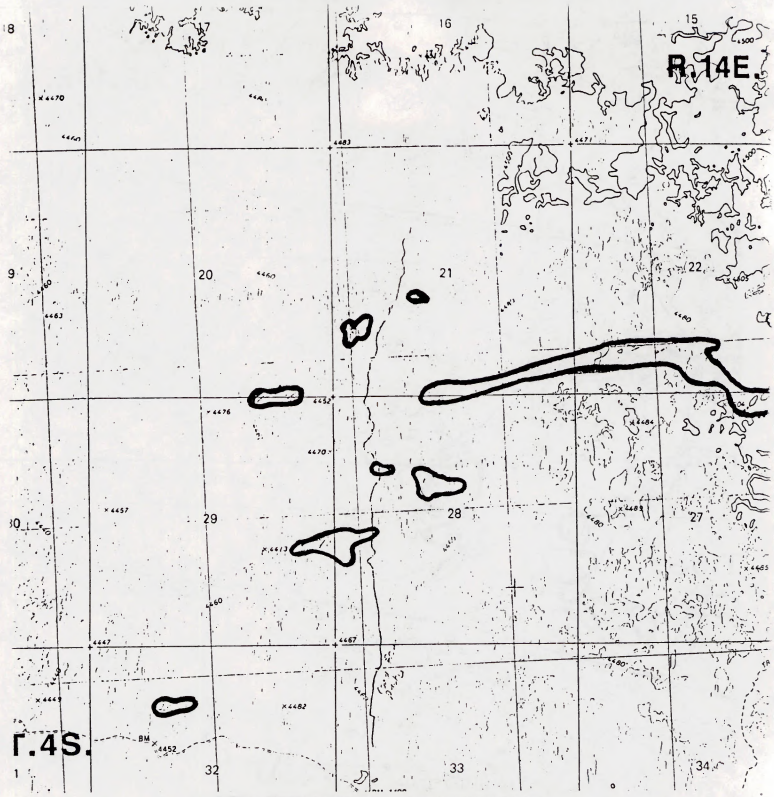
APPENDIX B-1. Shoshone BLM District: Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs. Unsurveyed Sites
GOODING SE Quadrangle 1:24,000



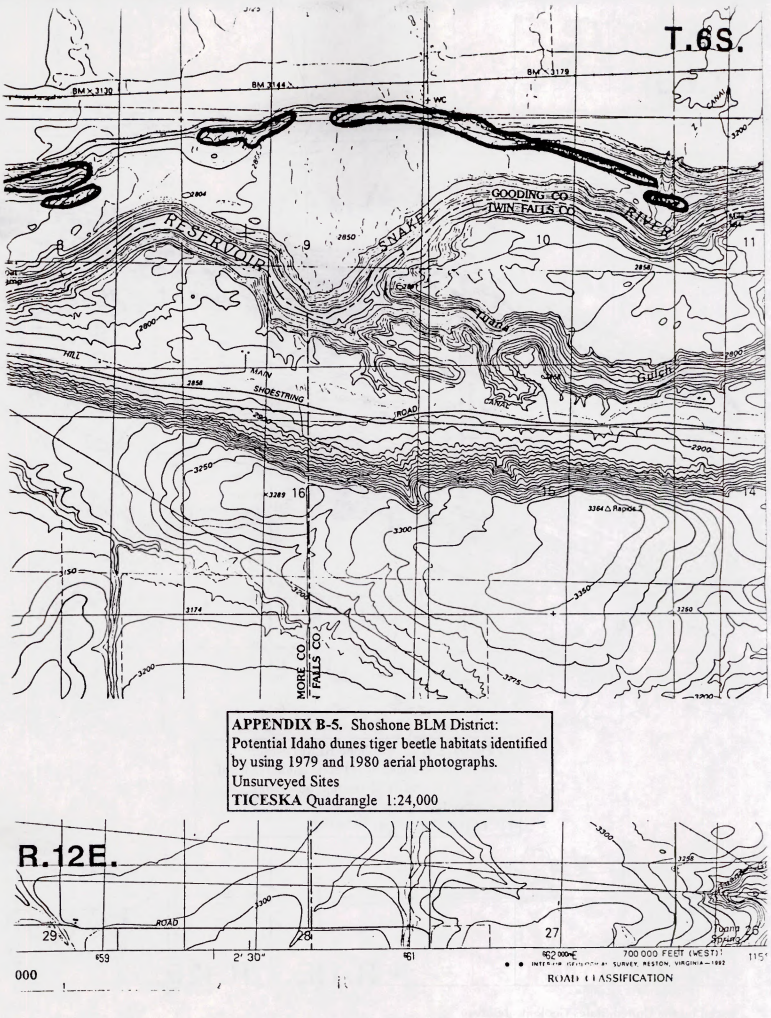
APPENDIX B-2. Shoshone BLM District: Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs. Unsurveyed Sites
GOODING SE Quadrangle 1:24,000



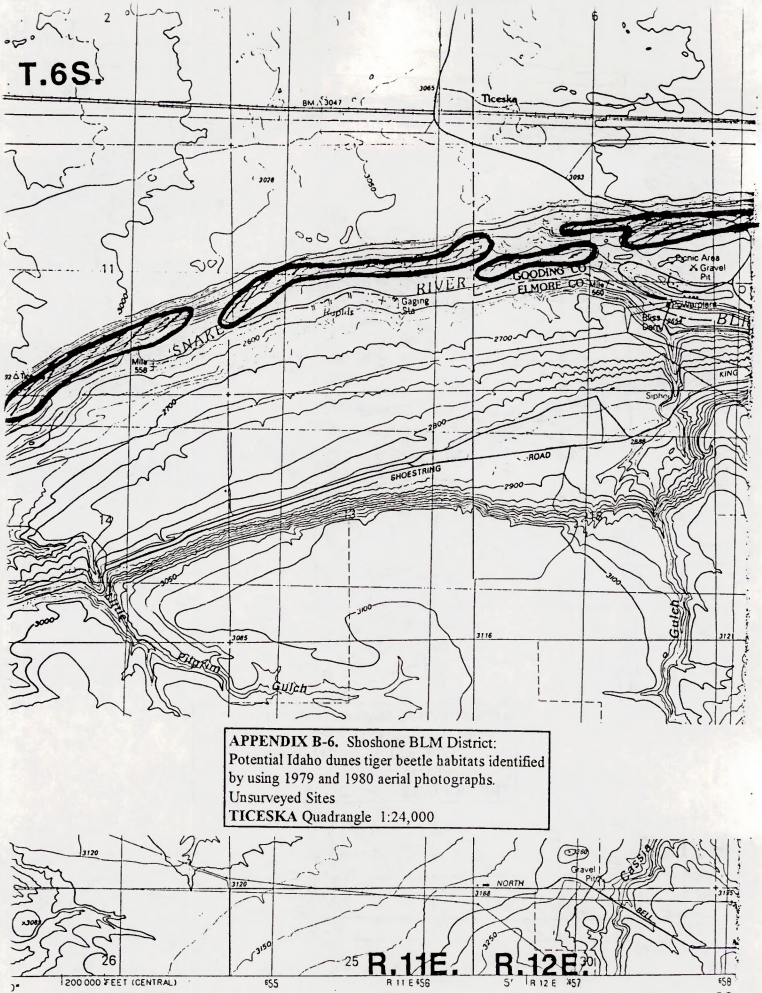
APPENDIX B-3. Shoshone BLM District:
Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs.
Unsurveyed Sites
TUNUPA Quadrangle 1:24,000



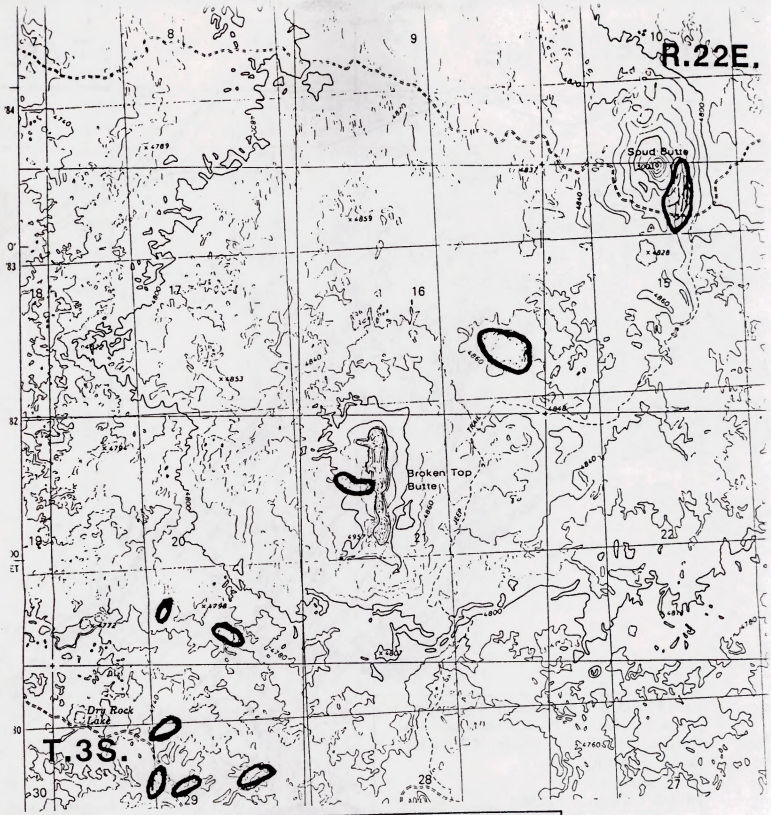
APPENDIX B-4. Shoshone BLM District: Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs.
Unsurveyed Sites
BLACK RIDGE CRATER Quadrangle 1:24,000



APPENDIX B-5. Shoshone BLM District: Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs. Unsurveyed Sites
TICESKA Quadrangle 1:24,000



APPENDIX B-6. Shoshone BLM District: Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs.
Unsurveyed Sites
TICESKA Quadrangle 1:24,000



APPENDIX B-7. Shoshone BLM District:
Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs.
Unsurveyed Sites
WAGON BUTTE Quadrangle 1:24,000

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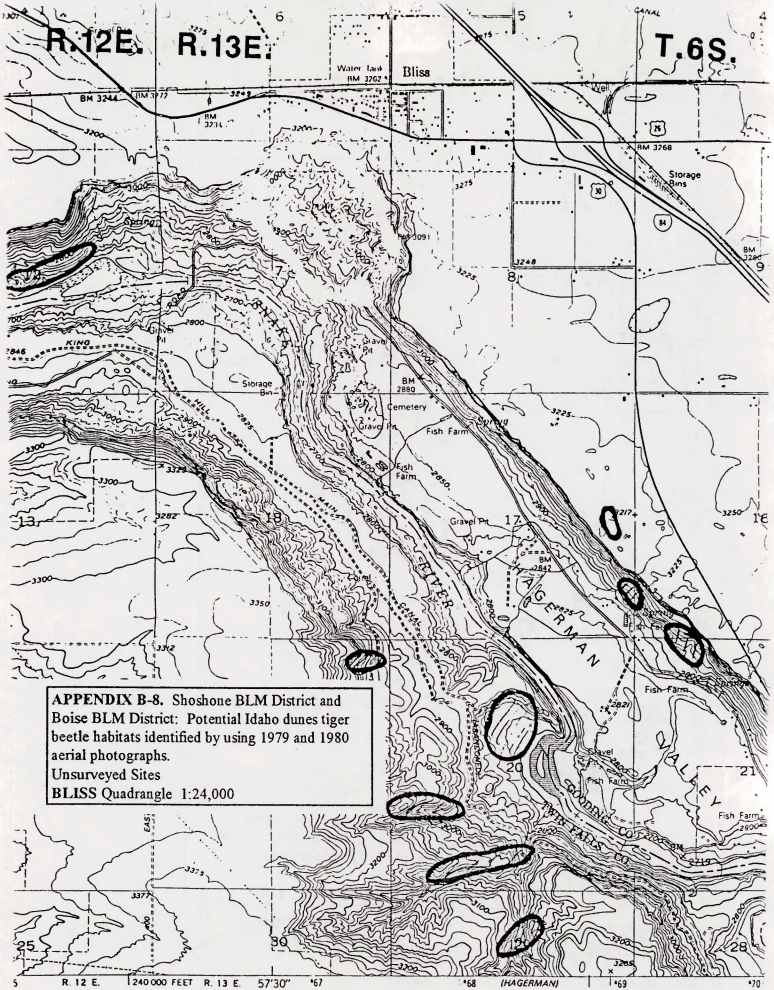
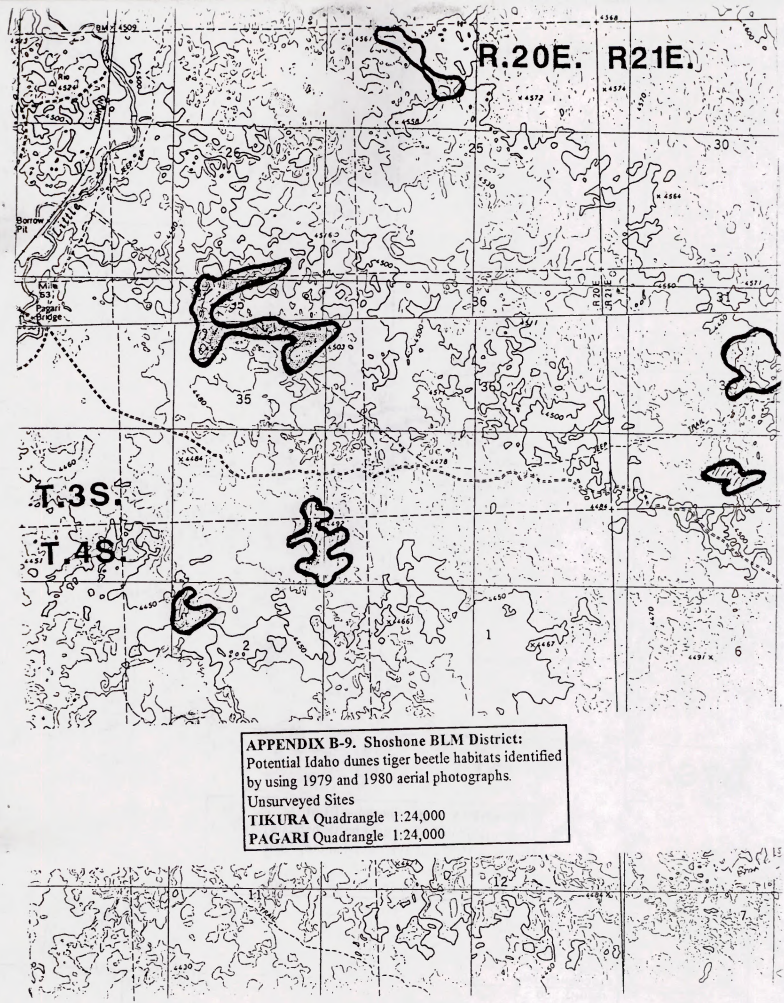
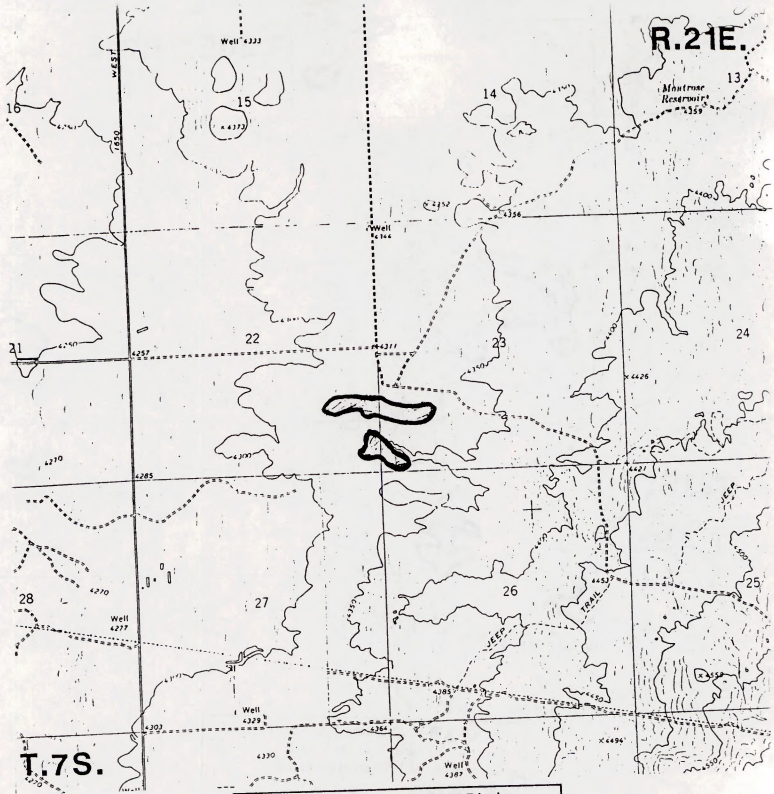


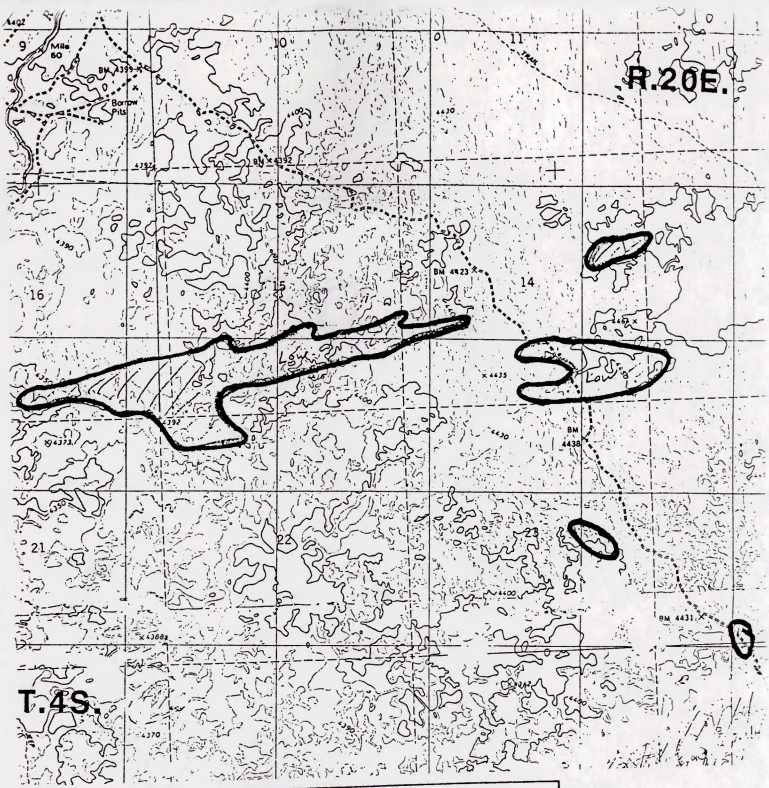
APPENDIX B-8. Shoshone BLM District and Boise BLM District: Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs.
Unsurveyed Sites
BLISS Quadrangle 1:24,000



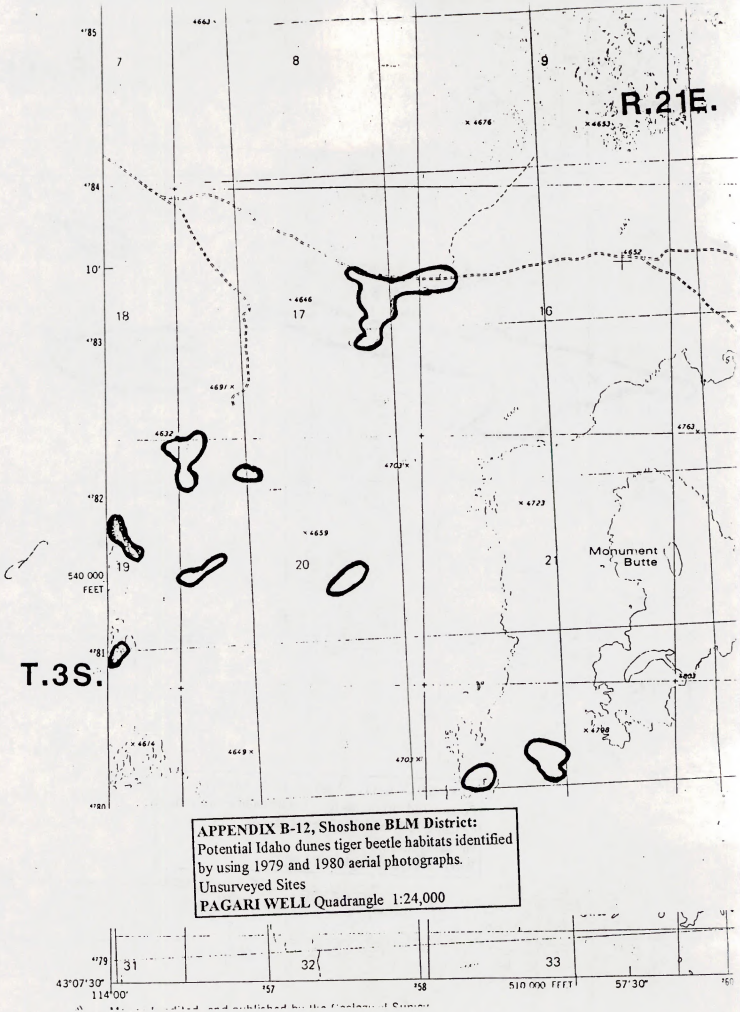
APPENDIX B-9. Shoshone BLM District:
Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs.
Unsurveyed Sites
TIKURA Quadrangle 1:24,000
PAGARI Quadrangle 1:24,000



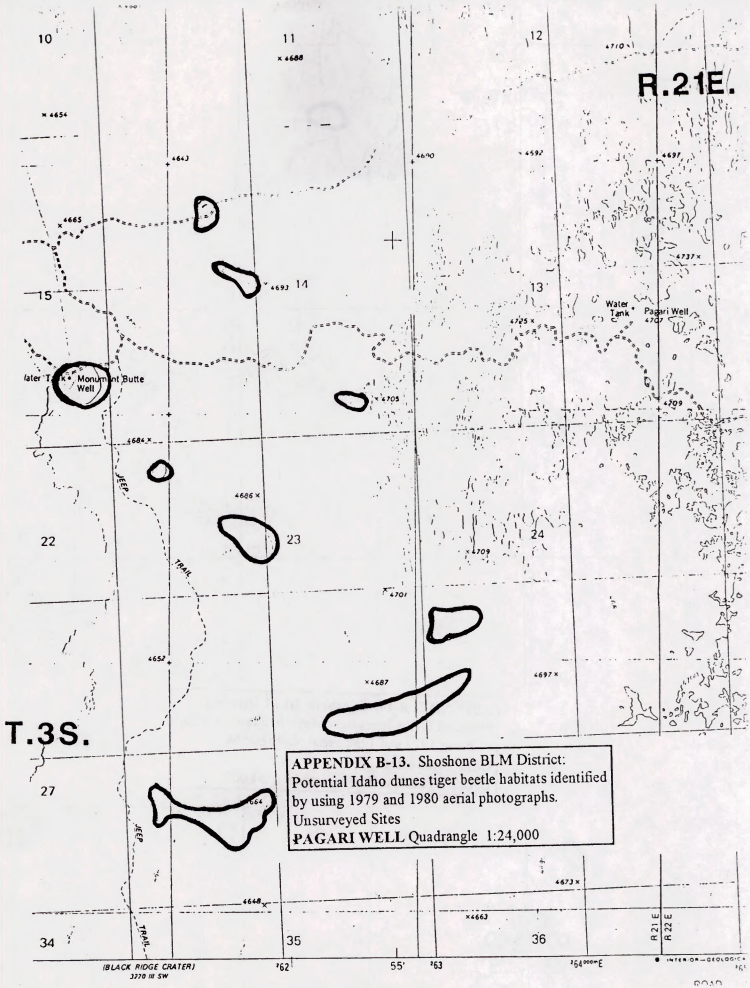
APPENDIX B-10. Shoshone BLM District: Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs.
Unsurveyed Sites
KIMAMA BUTTE Quadrangle 1:24,000



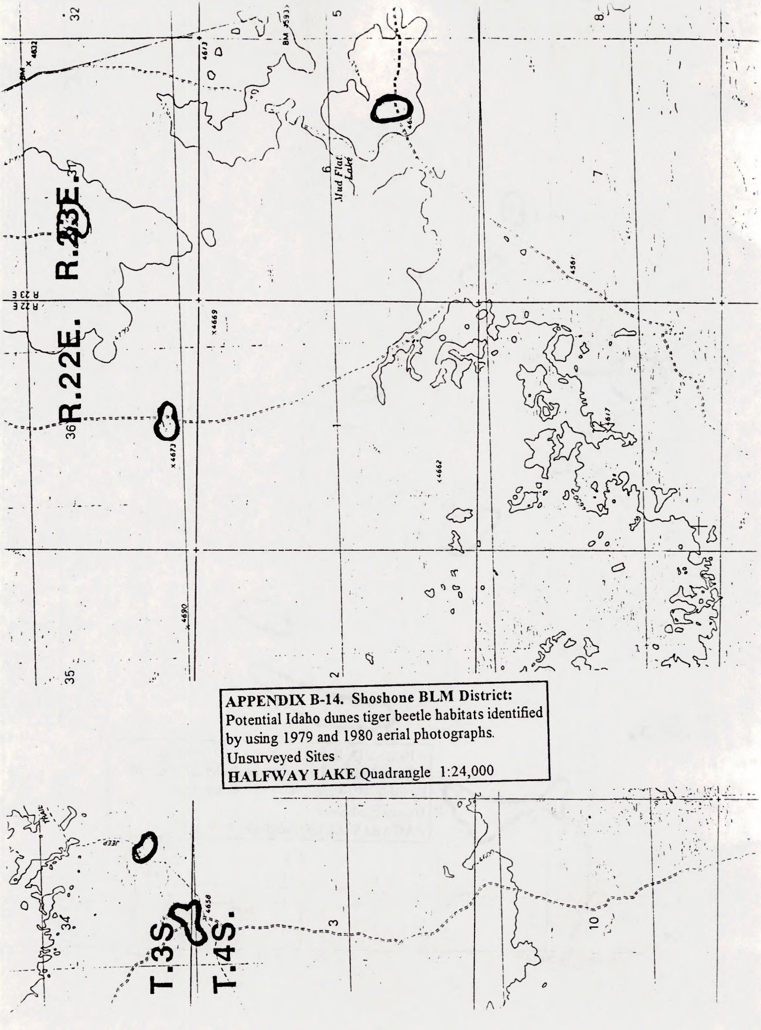
APPENDIX B-11. Shoshone BLM District: Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs. Unsurveyed Sites
PAGARI Quadrangle 1:24,000



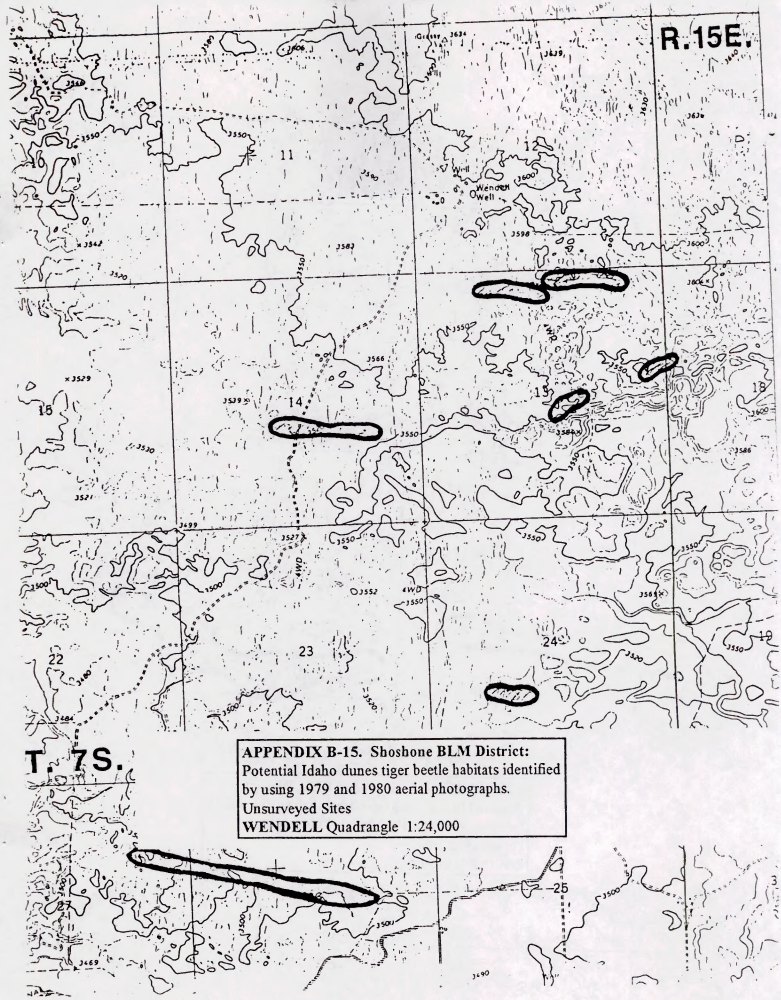
APPENDIX B-12, Shoshone BLM District:
Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs.
Unsurveyed Sites
PAGARI WELL Quadrangle 1:24,000



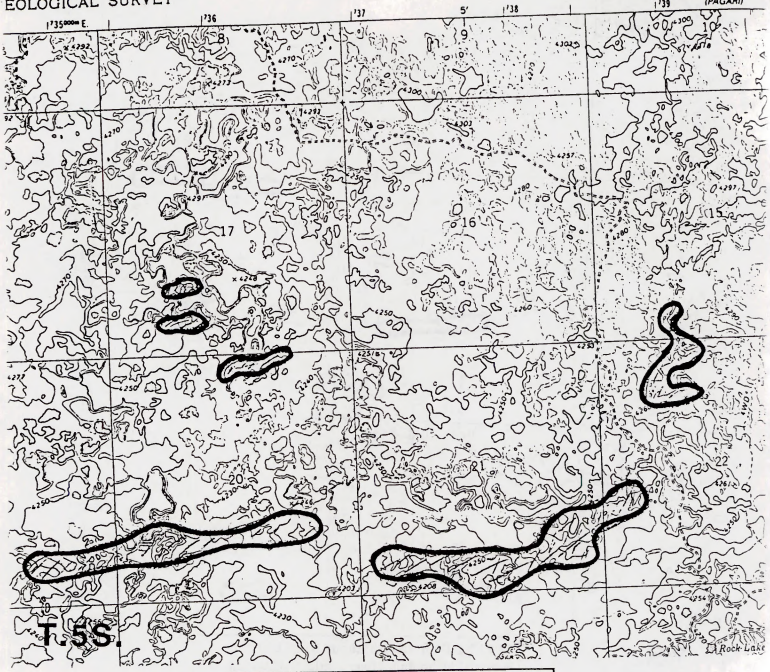
APPENDIX B-13. Shoshone BLM District: Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs. Unsurveyed Sites
PAGARI WELL Quadrangle 1:24,000



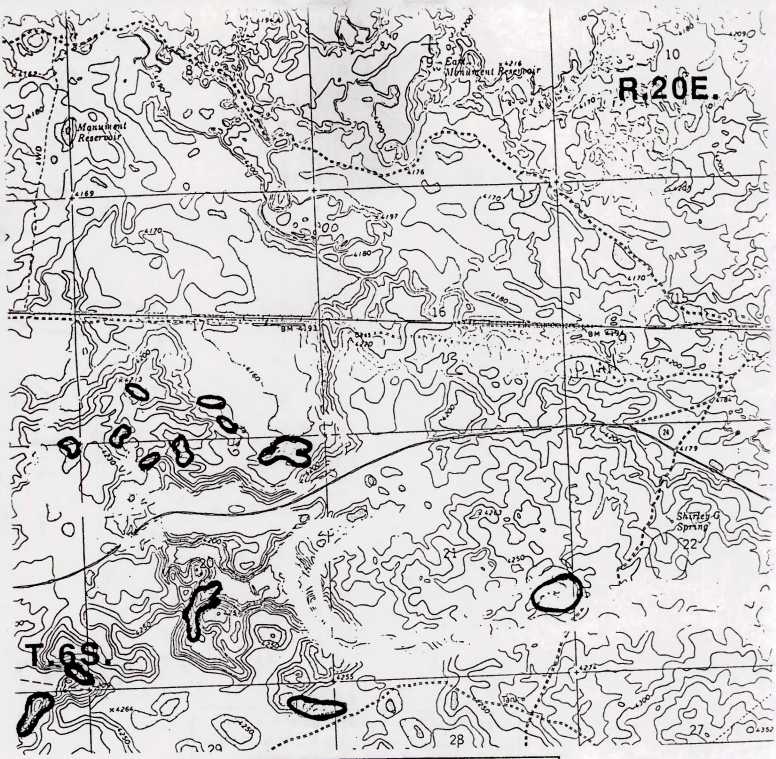
APPENDIX B-14. Shoshone BLM District:
Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs.
Unsurveyed Sites
HALFWAY LAKE Quadrangle 1:24,000



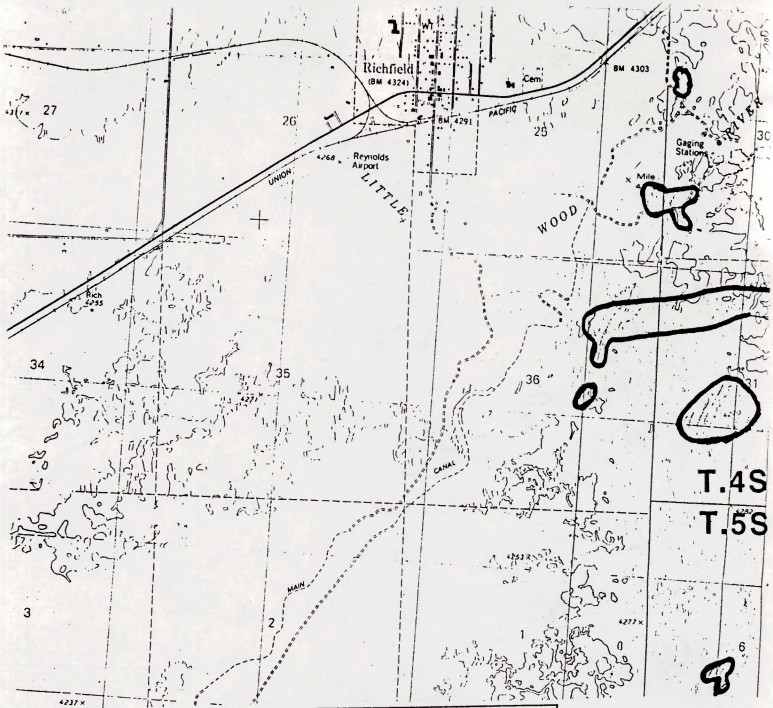
APPENDIX B-15. Shoshone BLM District: Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs. Unsurveyed Sites **WENDELL** Quadrangle 1:24,000



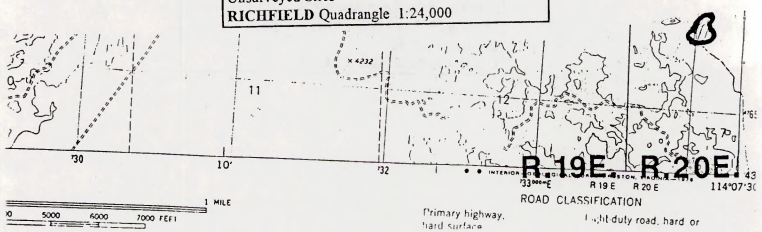
APPENDIX B-16. Shoshone BLM District:
Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs.
Unsurveyed Sites
OWINZA Quadrangle 1:24,000

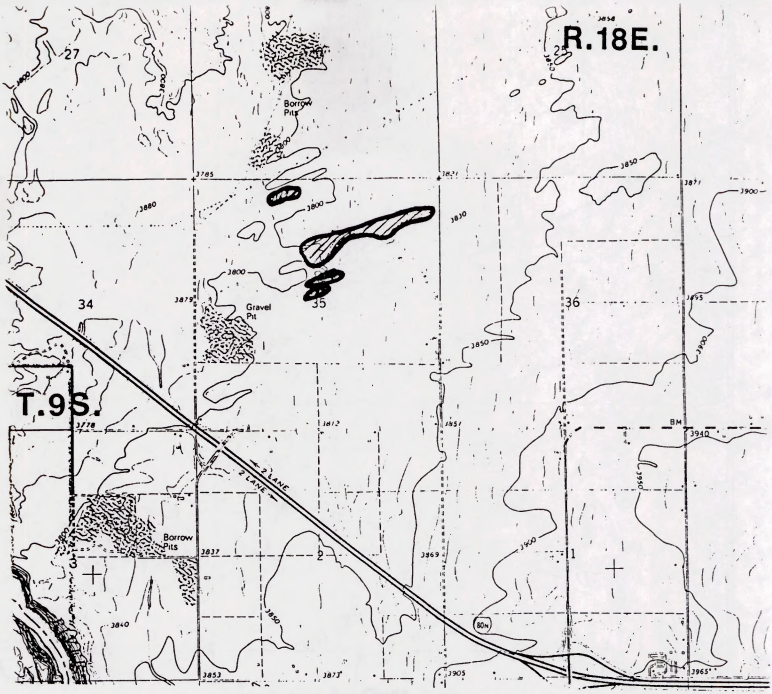


APPENDIX B-17. Shoshone BLM District: Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs.
Unsurveyed Sites
OWINZA Quadrangle 1:24,000

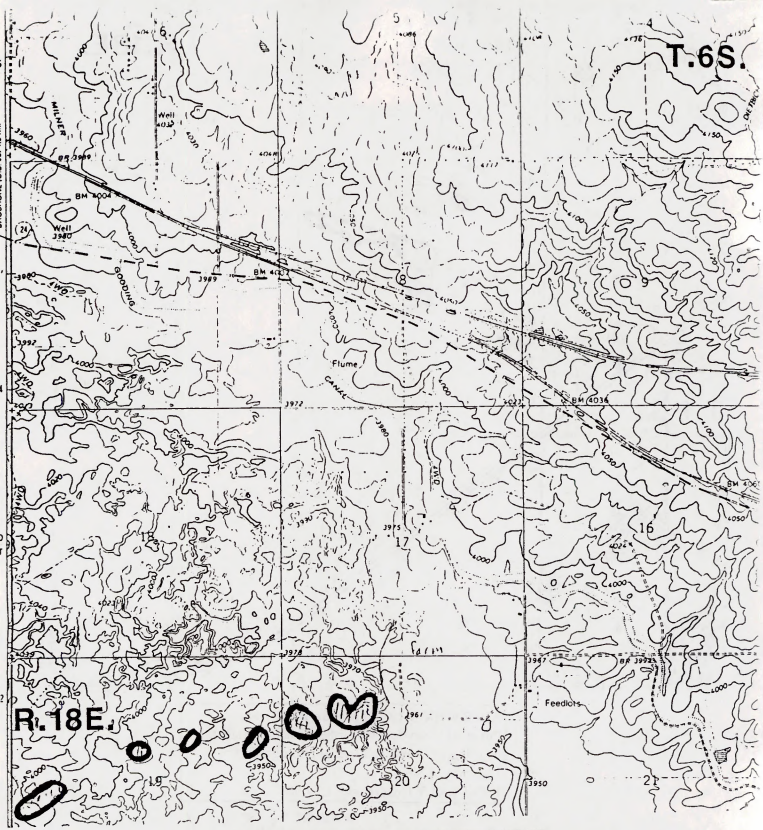


APPENDIX B-18. Shoshone BLM District:
Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs.
Unsurveyed Sites
RICHFIELD Quadrangle 1:24,000

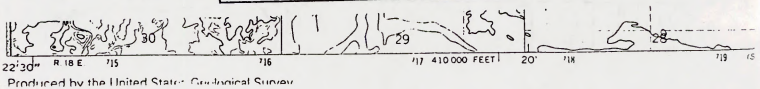




APPENDIX B-19. Shoshone BLM District:
Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs.
Unsurveyed Sites
KIMBERLY Quadrangle 1:24,000



APPENDIX B-20. Shoshone BLM District:
Potential Idaho dunes tiger beetle habitats identified by using 1979 and 1980 aerial photographs.
Unsurveyed Sites
DIETRICH Quadrangle 1:24,000



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